Trifolium shows what Linné really meant. In 1737 he cited five reduced genera with their diagnoses in an "Observation" under *Trifolium*, and in 1742 he added a sixth reduced genus (Gen. Pl. ed. 1, 229; ed. 2, 356; ed. 5, 337). In Species Plantarum, ed. 1, 764, however, he recognized only five subdivisions of *Trifolium*. These were *Meliloti* (corresponding with *Melilotus* Tourn.), *Lotoidea* (comprising, two reduced genera, *Lupinaster* Buxb. and *Trifoliastrum* Mich.), *Lagopoda* (including both *Lagopus* Riv. and *Triphylloides* Pont.), *Vesicaria* (corresponding to none of the reduced genera) and *Lupulina* (corresponding to *Lupulinum* Riv.). Here, where Linné actually published subdivisions of a genus, only two out of five corresponded with individual reduced genera, two other subdivisions each comprised two of the reduced genera, and the fifth corresponded to none of them.

Take another example, that of *Centaurea* L. Gen. Pl. ed. 5, 389. The "Observation" included the names of *eight* reduced genera with their diagnoses, namely, *Calcitrapa*, *Calcitrapoides*, *Rhaponticum*, *Rhaponticoides*, *Amberboi*, *Jacea*, *Cyanus*, *Crocodilium*. In Sp. Pl. ed. 1, 909, Linné recognized only six subdivisions, namely *Jacea*, *Cyani*, *Rhapontica*, *Stoebae*, *Calcitrapae*, *Crocodiloidea*. It should be obvious that reduced genera cited in an "Observation" by Linné with diagnoses were not necessarily regarded by him as sections.

In conclusion I may refer to Mr. Mackenzie's argument that Linné's "account of certain parts of the flower in his description of the genus in the first five editions of the Genera Plantarum *began* with certain phrases applicable only to the yellow water lily" [the italics are mine]. As Conard has pointed out, Linné's description *went on* with certain phrases applicable only to the white water lily. Perhaps I may be pardoned for having assumed that Mr. Mackenzie was here relying on "priority of place" in the description.

CONTRIBUTIONS FROM THE GRAY HERBARIUM OF HARVARD UNIVERSITY,—NO. LXXIX.

(*Continued from page 49.*)

VI. PRIMULA § FARINOSAE IN AMERICA

(Plate 169)

THE genus *Primula*, only slightly represented in America, but one of largest genera in the flora of Eurasia, is notoriously difficult of

classification. In America we know little of the complications which the student of the Eurasian flora must consider in untangling the species; but in the § *Farinosae* we have a slight illustration of these difficulties. This is best shown by the fact that the European *P. farinosa* L., which is apparently not found in America, has for more than a century held an undisputed, though changeable, position in our flora; and, although perfectly distinct species with natural geographic ranges, such as *P. mistassinica* Michx. (1803), *P. decipiens* Duby (1844), *P. incana* Jones (1895) and *P. specuicola* Rydb. (1913), have from time to time been set off, their authors have often stated that their new segregates were being distinguished from *P. farinosa*, which they believed to occur elsewhere in America.

Primula farinosa seems first to have been listed as a member of the American flora in 1813 when Muhlenberg[1] cited it as a Canadian plant with *white* corolla. Just what he referred to is not clear unless it were *P. mistassinica*, forma *leucantha*. *P. farinosa* was more definitely admitted to our flora by Nuttall[2] in 1818, as growing "On the calcareous gravelly shores of the islands of Lake Huron; . . . and . . . in the outlet of Lake Michigan," Nuttall's plant being really a species intermediate between *P. farinosa* and *P. mistassinica*. In 1822 Torrey[3] again identified the plant of the shores of Lake Huron with *P. farinosa*, saying: "On a careful comparison of the American plant with specimens of *P. farinosa*, from Germany and Norway, I can find no difference except that the leaves are more *toothed* than *crenate* in the former"; and, on account of the leaves Torrey[4] later called the plant of Lakes Huron and Michigan *P. farinosa β. americana* but wrongly identified with it *P. pusilla* Goldie,[5] this time saying: "*Professor Hooker*, however, thinks the P. *pusilla* of *Goldie* to be very distinct from P. *farinosa;* though there can be no doubt that it is the plant described above." Goldie's *P. pusilla*, however, as shown by his description, illustration and locality (near Quebec), was a common broad-leaved phase of *P. mistassinica*, with which species it has subsequently been generally united; and it is not conspecific with the plant described by Torrey.

Gradually in America the conviction became firmly established, that *P. farinosa* has farinose lower leaf-surfaces and calyx, *P. mistas-*

[1] Muhl. Cat. 19 (1813).
[2] Nutt, Gen. i. 119 (1818).
[3] Torr. Am. Journ. Sci. iv. 59 (1822).
[4] Torr. Fl. No. and Mid. U. S. i. 213 (1824).
[5] Goldie, Edinb. Phil. Journ. vi. 322, t. xi, fig. 2 (1822).

sinica green and efarinose; and with this highly inconstant vegetative character as the leading difference the two are distinguished in recent manuals. In the *Synoptical Flora* Gray[1] so maintained *P. farinosa* for the farinose plants of the Gulf of St. Lawrence region (Labrador to Nova Scotia and eastern Maine), Lake Superior, the Rocky Mountains and southern South America (four quite distinct species) and merged them without question with the very different Eurasian plant; while, merely because of its efarinose quality, he placed under *P. mistassinica* the otherwise quite distinct *P. stricta* Hornem. of the arctic regions. In 1907, still clinging to the tradition that all plants with pronounced mealiness on the foliage or calyx are *P. farinosa* but not satisfied that the species was a unit, I suggested[2] the division of the American plant into typical *P. farinosa* and three varieties; var. *americana* Torr. (a species endemic on the shores of the upper Great Lakes), var. *macropoda* Fernald (a mixed series, but primarily based on the plant centering about the Gulf of St. Lawrence) and var. *incana* (Jones) Fernald, based on *P. incana* of the Rocky Mountains and Great Plains. But the most reactionary treatment is that of Pax & Knuth[3] in *Das Pflanzenreich*, where not only are *P. mistassinica* and *P. decipiens* ("*P. magellanica*") mingled with *P. farinosa*, but where *P. farinosa*, subsp. *eufarinosa*, var. *genuina* Pax is made to include, of course, true *P. farinosa* of Europe, but also the Rocky Mountain and Great Plain *P. incana* and (by citation of specimens) the species of the Gulf of St. Lawrence which I have called *P. farinosa*, var. *macropoda*, but which is really quite distinct from both the European and the Rocky Mountain species. Only a casual examination of typical European *P. farinosa*, the Great Plain and Rocky Mountain *P. incana* and the eastern American *P. farinosa*, var. *macropoda* is needed to show how artificial is a classification which makes the three species quite identical (subsp. *eufarinosa*, var. *genuina*!): European *P. farinosa*, a very slender plant with the subulate involucral bracts 4–7 mm. long, mostly only ½–⅓ as long as the filiform pedicels, the mature (fruiting) strongly ribbed calyx 4–6 mm. long, the corolla-lobes 4–6 mm. broad; *P. incana* coarser, with the lanceolate to linear-oblong flat involucral bracts 0.5–1 cm. long, mostly nearly equaling to exceeding the short and stout flowering pedicels, the mature calyx 8–10 mm.. long and only obscurely ribbed,

[1] Gray, Syn. Fl. ii. pt. 1: 58 (1878).
[2] Rhodora, ix. 15, 16 (1907).
[3] Pax & Knuth in Engler, Pflanzenr. iv[237]. Primulaceae (1905).

the corolla-lobes 2–3 mm. broad; *P. farinosa*, var. *macropoda*, a coarse plant with subulate involucral bracts 0.5–1.4 cm. long and with stout pedicels, the mature almost ribless calyx 5.5–11 mm. long, the corolla-lobes 3.5–5.5 mm. broad.

Or again, the essentially Canadian *Primula mistassinica*, which superficially more closely simulates *P. farinosa* than do the other species, but which has consistently different seeds, is a very delicate and slender plant with subulate involucral bracts only 2–6 mm. long, elongate filiform pedicels, mature calyx 3–6 mm. long and only 2–3.5 mm. in diameter, and tiny smooth or obscurely reticulated seeds rarely 0.5 mm. long (European *P. farinosa* with coarser and conspicuously pebbled or reticulated seeds); but the Magellanic species (included by Pax & Knuth along with the Canadian *P. mistassinica* under *P. farinosa*) is stout (scapes up to 4 mm. thick), with flat lanceolate involucral bracts 6–10 mm. long, umbel almost capitate owing to the abbreviated stout pedicels, mature calyx about 1 cm. long and 5 mm. in diameter, and with the largest seeds of the section, fully 1 mm. long and covered with long and conspicuous murications. That as plants *P. mistassinica* and the coarse plant of southern South America are not conspecific is perfectly apparent and their inclusion along with *P. incana* and others in *P. farinosa* by Pax & Knuth is due to the reliance by those authors upon single key-characters, rather than upon the sum-total of characters which really mark the different species but which, throughout their work, they largely ignore.

The result of reliance upon single, and almost exclusively vegetative, characters is inevitably either under-classification, such as has just been illustrated, or over-classification and the complete segregation in a treatment of plants which are really closely related or even of individuals of a single species. The sections of *Primula* defined by Pax and Knuth well illustrate this difficulty. Thus, the only character given by them in *Das Pflanzenreich* for the § *Minutissimae* (3 species of Thibet and the Himalaya) is "Species stoloniferae," the succeeding 16 sections (including § *Farinosae*) being "Species astolonae." Nevertheless, *P. mistassinica* (included by them under *P. farinosa*) may sometimes develop flagelliform and leafy stolons up to 7 cm. long! Again, § *Farinosae* is distinguished from all the 8 succeeding sections by "Bracteae involucrales basi gibbosae vel saccato-productae," yet *P. farinosa* and four others in the section

are promptly grouped together because they have "Bracteae basi vix gibbosae." Based upon single characters, such as are above illustrated, the sections and keys to species of *Das Pflanzenreich* are perplexing and contradictory in the extreme; and it is impossible to avoid the conviction that a vast reduction and reorganization will be necessary before *Primula* attains a natural classification. The *Farinosae* in America are certainly real entities and when their different characters are closely studied they resolve themselves very satisfactorily into species with definite combinations of characters, especially of flowers, fruits and seeds, and with clearly defined and natural geographic ranges. As a result of an intensive study of this small group extending over several weeks the following treatment of the American species is proposed as at least some advance over the treatments heretofore available, although, on account of poor material, it is still necessary to treat two or three plants in a tentative and, therefore, unsatisfactory manner.[1]

Besides the material in the Gray Herbarium and the herbarium of the New England Botanical Club, I have had the great advantage of examining the splendid series of specimens in the National Herba-

[1] One species of § *Nivales* and, therefore, not included in the following synopsis is not generally passing under its earliest specific name and should have its nomenclature clarified. This is the species treated by Gray in the *Synoptical Flora* as *P. nivalis* Pallas. Subsequently, it has been repeatedly shown that the plants of the Bering Sea region are quite distinct from Pallas's species of central and western Asia; but the characters relied upon by Pax and by Greene to separate the Bering Sea plant into two species do not hold. Thus Pax, following Greene, distinguished *P. eximia* Greene from *P. pumila* (Ledeb.) Pax by "Corollae lobi . . . acuti, non emarginati" as contrasted with "Corollae . . . lobi . . . retusi vel leviter emarginati vel integri" in *P. pumila;* but Mrs. Busch's beautiful plate shows them both with obtuse and strictly entire summits, while specimens from the type-station, St. Paul's Island, show conclusively that the lobes of *P. eximia* may be definitely emarginate. Differing only in size of parts the two are apparently not separate species, but they are well marked varieties and Mrs. Busch so treats them. She fails, however, to take up the earliest specific name, not apparently because it is of difficult pronunciation, but because she consistently retains the oldest name of whatever rank and consequently adhers to *P. pumila* (Ledeb.) Pax. By the International Rules the names of the two varieties are

P. Tschuktschorum Kjellm., var. **pumila** (Ledeb.), n. comb. *P. nivalis*, γ. *pumila* Ledeb. Fl. Ross. iii. 10 (1847–49). *P. nivalis* Gray, Syn. Fl. N. A. ii. pt. 1: 59 (1878), not Ledeb. *P. Tschuktschorum* Kjellm. in Nordensk. Vega-Exp. Vetensk. Jagtt, i. 516, t. ix. (1882) in part, and Wissenschaftl. Ergebn. Vega-Exped. 331, t. 5 (1883). *P. pumila* (Ledeb.) Pax, Engler's Bot. Jahrb. x. 208 (1889). *P. pumila*, var. *Ledebouriana* E. Busch, Fl. Sib. et Orient. Extr. Cem. 65: 75, fig. B (1926).

Var. **arctica** (Koidzumi), n. comb. *P. nivalis* Gray, Syn. Fl. N. A. ii. pt. 1: 59 (1878) in part, not Ledeb. *P. eximia* Greene, Pittonia, iii. 251 (1897); J. M. Macoun in Fur Seals and Fur-Seal Isl. N. Pacif. Oc. iii. 568, t. xcii. (1899). *P. Macounii* Greene, l. c. 251, 260 (1897); J. M. Macoun, l. c. 569, t. xciii (1899). *P. arctica* Koidzumi, The Bot. Mag. (Japan), xxv. 216 (1911). *P. pumila*, var. *arctica* (Koidzumi) E. Busch, Fl. Sib. et Orient. Extr. Cem. 65: 75, fig. A (1926).

rium of Canada (cited as "Can.") kindly placed at my disposal by Dr. Malte, and the Primulas in the herbaria of the University of Minnesota (cited as "Minn.") generously loaned by Dr. Butters, and of the University of Pennsylvania submitted by Mr. Fogg.

Key to American Species of Primula § Farinosae

a. Bracts of involucre subulate, lanceolate or linear-oblong above the dilated base, tapering gradually to the tip; their bases either gibbous, rounded or tapering, rarely much prolonged —*b.*

b. Leaves mostly dentate or at least distinctly crenate, petioled or merely narrowed to base, farinose or efarinose: limb of corolla 0.5–2 cm. across: mature capsule from shorter than to at most twice as long as the calyx, thick-cylindric to ellipsoid-ovoid, 2–5 mm. in diameter: seeds dark-brown or fulvous, smooth or rough—*c.*

c. Comparatively stout plants: scape 0.6–4 mm. in diameter just below the involucre, excluding the umbel 0.1–4.5 dm. high: involucral bracts 0.3–1.4 cm. long: pedicels 0.4–1 mm. in diameter: mature calyx 3.8–11 mm. long, 2.5–6 mm. in diameter at summit of tube: anthers and stigma overtopped by the corolla-tube, not exserted from the throat of the shrivelled corolla: capsules 2.5–5 mm. in diameter: seeds muricate or distinctly reticulated (cf. no. 6), 0.5–1 mm. long—*d.*

d. Lobes of mature calyx obtuse to acute but not subulate-tipped: corolla-tube 4–7 (rarely –9) mm. long; lobes shallowly emarginate to deeply obcordate: capsule equaling to exceeding the calyx—*e.*

e. Bracts of involucre subulate or tightly involute above the dilated base.

Leaves green beneath, very rarely a little farinose, subentire or obscurely undulate-dentate, 0.5–4 cm. long, 0.2–1.5 cm. broad: mature calyx 3.8–6 mm. long, efarinose or only scantily farinose; the lobes about half as long as the tube: limb of corolla 5–8 mm. broad; lobes oblong or narrowly cuneate, 1–3 mm. broad, shallowly emarginate, the segments 0.2–1 mm. long ..... 1. *P. stricta.*

Leaves strongly farinose (rarely efarinose) beneath, mostly dentate, 1–13 cm. long, 0.3–3 cm. broad: mature calyx 5.5–11 mm. long, usually strongly farinose; lobes about equaling the tube: limb of corolla 9–13 mm. broad; lobes broadly obcordate, 3.5–5.5 mm. broad, with segments 1.5–3 mm. long ..... 2. *P. laurentiana.*

e. Bracts of involucre lanceolate to linear-oblong, flat (slightly involute only on drying).

Calyx copiously farinose; the oblong obtuse or rarely acutish lobes shorter than the tube: corolla-tube slightly exceeding the calyx; limb 6–10 mm. broad, lilac, with oblong to cuneate-obovate lobes 2–3 mm. broad: capsule only slightly exceeding the calyx: seeds 0.5–0.7 mm. long, strongly angled ..... 3. *P. incana.*

Calyx efarinose or only sparingly farinose; the oblong-lanceolate acute to obtuse lobes equaling the tube: corolla-tube shorter than to barely equaling the calyx; its white (rarely lilac-tinged) limb 1.2–2 cm. broad, with lobes 3.5–6 mm. broad: capsule distinctly exceeding the calyx: seeds 1 mm. long, rounded-obovoid.....4. *P. decipiens.*

d. Lobes of mature calyx sharply acuminate to subulate-tipped: corolla-tube 8–10 mm. long; its limb 6–10 mm. broad, with the narrowly cuneate lobes merely emarginate: capsule much overtopped by the calyx-lobes.....5. *P. specuicola.*

c. Comparatively slender: scapes 0.3–1.8 mm. in diameter just below the involucre, excluding the umbel 0.1–2.5 dm. high: involucral bracts 2–6 mm. long: pedicels 0.2–0.5 mm. in diameter: mature calyx 3–6 mm. long, 2–3.5 mm. in diameter at summit of tube: stigma or tops of anthers exserted from the throat of the shrivelled corolla: capsule 2–3 mm. in diameter: seeds smooth or only obscurely reticulated (strongly reticulated in no. 6), 0.3–0.6 mm. long—*f.*

f. Most of the leaves merely cuneate at base or narrowed gradually to the broad subpetiolar base, with 2–15 pairs of teeth: involucral bracts rarely saccate-gibbous at base—*g.*

g. Seeds strongly angulate and truncated, prominently rugose or reticulated: leaves often farinose beneath. 6. *P. intercedens.*

g. Seeds rounded-obovoid, nearly smooth or obscurely linear-reticulated.

Leaves copiously farinose beneath, somewhat rhombic: pedicels and calyx farinose.....7. *P. ajanensis.*

Leaves green, very rarely farinose, oblanceolate to obovate: pedicels efarinose: calyx usually efarinose.....8. *P. mistassinica.*

f. Most of the leaves with petioles longer than the rather abruptly dilated rhombic, ovate or cuneate-obovate blades; the blades with few (1–7) pairs of teeth confined to the upper half or entire.

Corolla-limb 7–10 mm. broad; its emarginate to obcordate lobes 1.5–3 mm. broad: involucral bracts not saccate at base.....9. *P. parvifolia.*

Corolla-limb 1.2–2 cm. broad; its deeply obcordate lobes 5–8 mm. broad: involucral bracts usually saccate-gibbous at base.....10. *P. borealis.*

b. Leaves entire, undulate or rarely slightly dentate, distinctly slender-petioled, efarinose: limb of corolla 5–9 mm. broad, white or violet; its cuneate lobes distinctly shorter than the tube, 1.6–4 mm. broad, cleft a third or half their length: mature capsules slender-cylindric, tapering at summit, becoming 2–3 times as long as the calyx, 7–13 mm. long, 1.8–2.1 mm. in diameter: seeds pale-brown to stramineous, smooth.....11. *P. egaliksensis.*

a. Bracts of involucre oblong or narrowly obovate, obtuse or abruptly contracted at tip; their bases often prolonged into narrow saccate auricles 1–1.5 mm. long: leaves slender-petioled, entire.....12. *P. sibirica.*

1. P. STRICTA Hornem. *Leaves green,* or only sparingly farinose beneath, oblanceolate to narrowly obovate, *entire to obscurely undulate-dentate,* 0.5–4 cm. long, 0.2–1.5 cm. broad: *scape* 1.5–30 cm. high, rather strict and stout, *1–2 mm. in diameter* below the inflorescence, green or purplish and *efarinose: involucral bracts lance-subulate,* usually saccate or gibbous at base, *3–8 mm. long:* umbel 2–8-flowered: pedicels erect or nearly so, in anthesis from shorter than to twice as long as the bracts: *calyx* urceolate-campanulate, *efarinose, in maturity 3.8–6 mm. long, 3.5–5 mm. in diameter* at summit of tube; the *lobes* oblong to narrowly deltoid, obtuse to acute, *about half as long as the tube: corolla* lilac or violet; the *tube distinctly exserted; the limb 5–8 mm. broad; lobes oblong to narrowly cuneate, 1–3 mm. broad,* shallowly notched, the *segments 0.2–1 mm. long; capsule* ellipsoid, *only slightly exceeding the calyx,* 3–4 mm. in diameter: seeds more or less angulate, dark-brown or fulvous, 0.5–0.8 mm. long, conspicuously reticulated. —Hornem. in Fl. Dan. viii. fasc. 24, t. mcccIxxxv. (1810); Duby in DC. Prodr. viii. 44 (1844); Lange, Consp. Fl. Groenl. 70 (1880); Pax & Knuth in Engler, Pflanzenr. iv[237]. 86 (1905); J. M. Macoun & Holm, Rep. Can. Arct. Exped. 1913–18, v. pt. A. t. xi. fig. 6 (1921); E. Busch, Fl. Sib. et Orient. Extr. iv. Cem. 65: 38 (1926). *P. farinosa, β. stricta* (Hornem.) Wahlenb. Fl. Lapp. 60 (1812). *P. Hornemanniana* Lehm. Monogr. Prim. 55, t. 4 (1817); Hook. Fl. Bor.-Am. ii. 120 (1838), in small part only. *P. glabrescens* F. Nylander ex W. Nyl. & Saelan, Herb. Mus. Fenn. (1859) 32, acc. to Pax & Knuth. *P. mistassinica* Gray, Syn. Fl. N. A. ii. pt. 1: 58 (1878) in part, not Michx. (1803). *P. farinosa,* var. *mistassinica* Pax, Engler's Bot. Jahrb. x. 200 (1889) in part, not *P. mistassinica* Michx. (1803). *P. farinosa,* var. *groenlandica* Pax in Engler, Pflanzenr. iv[237]. 84 (1905) in part, not *P. stricta,* var. *groenlandica* Warming (1886). *P. farinosa,* var. *macropoda* Fernald, RHODORA, ix. 16 (1907) in small part (as to citation of Keewatin plant). *P. stricta* var. *jacutensis* E. Busch, Fl. Sib. et Orient. Extr. iv. Cem. 65: 36 (1926).—Arctic and subarctic Eurasia, Greenland and North America; with us south to northern Labrador, northwestern Quebec, northern Ontario and Alberta. The following American specimens have been examined. GREENLAND: without locality, ex *Lehmann;* Umenak, *Rink;* Atâ, lat. 70° 16′, August 6, 1921, *A. E. Porsild;* Qeqerlatik Najarsuit, lat. 66° 44′, August 3, 1911, *M. P. & A. E. Porsild;* Kügsinerssuaq and Atâ, lat. 70° 17′, July 11, 1923, *M. P. Porsild;* Itivdleq-Fjord, Quingua, lat. 66° 29′, July 6, 1926, *M. P. Porsild;* the Porsild specimens all distributed as *P. mistassinica.* LABRADOR: moist banks, Nachvak, *R. Bell,* no. 15,829 (Can.), as *P. mistassinica;* Rama, *A. Stecker,* no. 78, as *P. farinosa.* QUEBEC: Ungava ("northern Labrador"), 1884, *L. M. Turner,* July, 1897, *A. P. Low,* no. 24,529 (Can.), as *P. egaliksensis;* River Kovik, lat. 61° 59′, Hudson Straits, *Low,* no. 23,025 (Can.), as *P. farinosa;* Richmond Gulf, June 28, 1890, *Spreadborough,* no. 14,421, June 12, 1899, *Low,* no. 63,242 (Can.), both as *P. sibirica;*

north of Cape Jones,[1] James Bay, *A. P. Low*, no. 63,244, as *P. stricta*, altered to *P. sibirica;* damp banks, South Twin Island, James Bay, *J. M. Macoun*, no. 15,831 (Can.), as *P. farinosa.* ONTARIO: "growing below high-water mark," west coast of Hudson Bay, lat. 56°, August, 1886, *J. M. Macoun*, no. 15,850 (Can.), as *P. mistassinica* or *P. sibirica;* Cape Henrietta Maria, *Spreadborough*, no. 62,555 (Can.); mouth of Ekwan River, James Bay, *Dowling*, no. 34,526 (Can.), as *P. farinosa;* The Beacon, mouth of Moose River, *Spreadborough*, no. 62,554 (Can.), as *P. sibirica.* MANITOBA: Churchill, lat. 58° 50′, *J. M. Macoun*, no. 79,388, as *P. stricta* or *P. farinosa;* Churchill River, *C. E. Cairnes*, no. 89,722 (Can.), as *P. mistassinica.* MACKENZIE: Arctic seacoast, *Richardson;* Mackenzie River, *Richardson;* south coast of Coronation Gulf, Port Epworth, *Cox & O'Neill*, no. 581; Bernard Harbour, *Frits Johansen*, no. 347; Great Bear River, *Elizabeth Taylor*, no. 87; shore, Great Slave Lake, *R. Bell*, no. 23,151 (Can.). YUKON: near mouth of Lewis River, *Gorman*, no. 1052 (Can.). ALBERTA: Rocky Mountains, *Drummond*, as *P. farinosa* or *P. scotica;* head of Pabocton Trail, *S. Brown*, no. 1107, as *P. borealis.*

The Greenland and American plants cited seem to me quite inseparable from Scandinavian material of typical *P. stricta*, although the tiny plants from the Arctic coast of Mackenzie might be set off as var. *jacutensis* E. Busch; they agree closely with Mrs. Busch's description and figure of the plant of northeastern Siberia, but seem more like dwarfed arctic extremes than a true variety.

Pax & Knuth exclude *P. stricta* from America and cite all Greenland and Labrador material under *P. farinosa*, var. *groenlandica*, which they base upon *P. stricta*, var. *groenlandica* Warming, Svensk. Vet. Akad. Handl. xii. Afd. iii. No. 2: 21, fig. 7, A–D (1886). Lange, Conspect. Fl. Groenl. 260 (1887), however, maintained both *P. stricta* and *P. stricta*, var. *groenlandica* Warm. in the Greenland flora, remarking that the latter is a "Forma intermedia inter P. strictam et P. egaliksensem." Surely, the figures of var. *groenlandica* published by Warming are of a plant scarcely, if at all, separable from *P. egaliksensis.* The distinctly petioled leaf with abruptly dilated entire blade, the large and plane involucral bracts, short flowering pedicels, comparatively slender calyx with narrow lobes, only slightly exserted corolla-tube with deeply-notched lobes are all characters of *P. egaliksensis* and Warming's figures are readily matched in that species, but not in *P. stricta.* In fact, Warming's

[1] The material is labeled in the hand of the late J. M. Macoun "North of Cape Jones, Hudson Strait"; but Low's report for 1899, when it was collected, explicitly refers to "Cape Jones at the entrance to James Bay"—See Low, Geol. Surv. Can. Ann. Rep. n. s. xii. 144A (1902).

figures are not appreciably unlike the original plate of the white-flowered *P. egaliksensis* Wormsk. in Hornem. Fl. Dan. ix. fasc. 26: t. mdxi. (1816), except that *P. stricta*, var. *groenlandica* has purple corollas. Just such a plant occurs across boreal America, in northern Newfoundland, northern Quebec, Alberta, British Columbia and Alaska; and of the abundant series which I have collected and studied in Newfoundland (six numbers, representing all stages from young flowers to mature fruit) the smaller specimens exactly match Warming's original figures of *P. stricta*, var. *groenlandica* and, better still, the four individuals in the Gray Herbarium of his type collection, gathered at Itivnek-Elvens in the Holstensborg District of Greenland on July 13, 1884. The Newfoundland plant with violet corollas, watched closely in the field, can be separated from typical white-flowered *P. egaliksensis* only by its intense color. Its fruit, collected at a specially marked station, is quite like that of *P. egaliksensis*, except that the capsules are deeper-colored: the slenderly cylindric capsules 2–3 times as long as the calyx and only 1.5–1.8 mm. thick (the capsules of *P. stricta* ellipsoid, only slightly exceeding the calyx and 3–4 mm. in diameter; the capsules of *P. farinosa* likewise ellipsoid, only slightly exserted and thick). Furthermore, in both *P. farinosa* and *P. stricta* the dark-brown seeds are obviously muricate or reticulated, in P. *egaliksensis* the stramineous or pale-brown seeds smooth or at most obscurely reticulated; and the seeds of *P. stricta*, var. *groenlandica* are like those of *P. egaliksensis*. It is now very clear, then, that *P. stricta*, var. *groenlandica* Warming belongs neither to *P. stricta* with which he placed it not to *P. farinosa* to which it was transferred by Pax & Knuth, but that it is a variation of *P. egaliksensis*, as Lange has already suggested. It is, furthermore, clear that most of the material cited by Pax & Knuth under *P farinosa*, var. *groenlandica* really belongs to *P. stricta*.

2. P. **laurentiana**, Fernald, nom. nov. (Plate 169). *Leaves farinose* (rarely efarinose) *beneath*, oblanceolate, spatulate or narrowly rhombic-ovate, *mostly* petioled and *dentate*, 1–13 cm. long, 0.3–3 cm. broad: *scape* 0.1–4.5 dm. high, strict and stout, *0.6–3 mm. in diameter* below the inflorescence, *often farinose at summit: involucral bracts lance-subulate or strongly involute*, usually strongly saccate or gibbous at base, *0.5–1.4 cm. long:* umbel 1–17-flowered: pedicels erect or strongly ascending, from practically wanting to 5 cm. long, comparatively stout (up to 1 mm. thick): *calyx* urceolate-campanulate, *usually farinose, in maturity 5.5–11 mm. long and 3–6 mm. in diameter* at summit of tube; the *lobes* lanceolate, oblong or narrowly deltoid,

obtuse to acute, *about equaling the tube: corolla* lilac; the *tube but slightly exserted; the limb 9–13 mm. broad; lobes broadly obcordate, 3.5–5.5 mm. broad, with segments 1.5–3 mm. long:* style and anthers not exserted from the yellow throat: capsule ellipsoid, from slightly exserted to twice as long as the calyx, 2.5–5 mm. in diameter; its valves splitting into linear halves 1.5–2 mm. wide: seeds angulate, 0.5–0.8 mm. long, conspicuously reticulated: flowers with the fragrance of *Narcissus Jonquilla;* roots musky.—*P. pusilla* Sweet, Brit. Fl. Gard. ser. 2, i. t. 5 (1831), not Goldie (1822). *P. farinosa* var. *macropoda* Fernald, Rhodora, ix. 16 (1907) mostly, including the type-specimen, not *P. macropoda* Craib, Notes Roy. Bot. Gard. Edinb, xi, 176 (1919). *P. scotica* Hook. Fl. Bor.-Am. ii. 120 (1838), not Hook. in Curt. Fl. Lond. iv. t. 133 (1821). *P. farinosa,* var. *genuina* Pax in Engler, Bot. Jahrb. x. 199 (1889) as to eastern American citations. *P. farinosa,* subsp. *eufarinosa,* var. *genuina* Pax & Knuth in Engler, Pflanzenr. iv[237]. 83 (1905), as to citation of eastern Canadian plant. *P. farinosa,* var. *americana* Fernald, Rhodora, xxviii. 224 (1926), not Torr. Fl. No. and Mid. U. S. i. 213 (1824). *P. farinosa,* var. *incana* St. John, Can. Dept. Mines. Mem. no. 126: 104 (1922); Fernald, Rhodora, xxviii. 224 (1926); not var. *incana* (Jones) Fernald Rhodora, ix. 16 (1907). *P. farinosa* of eastern Am. authors, not L. (1753).—Ledges and cliffs, chiefly calcareous, southern Labrador to Nova Scotia and eastern and north-central Maine. The following, selected from many specimens, are characteristic. Labrador: banks of Naskaupi River, about 18 miles from mouth, *Wetmore,* no. 103,037; Indian Harbor, lat. 54° 27′, *Ralph Robinson,* no. 102; Battle Harbor, *Bowdoin College Exped.* no. 104; Barge Point, July 17, 1913, *W. E. Ekblaw;* Forteau, 1870, *S. R. Butler.* Newfoundland: turfy limestone barrens, Burnt Cape, *Fernald, Wiegand, Pease, Long, Griscom, Gilbert & Hotchkiss,* no. 28,905; gravelly limestone shore, Schooner (or Brandy) Island, *Pease & Long,* no. 28,907; wet limestone ledges, St. Barbe, *Fernald, Long & Dunbar,* no. 26,956; talus of calcareous sandstone escarpments, Bard Harbor Hill, *Fernald & Long,* no. 28,912; calcareous rocks and talus, Port Saunders Harbor, *Fernald & Wiegand,* no. 3889; conglomerate limestone, etc., Cow Head, *Fernald & Wiegand,* nos. 3885, 3887; boggy spots on rocky crests, Twillingate, *Fernald, Wiegand & Bartram,* no. 6068; dry sea-cliffs, Tilt Cove, *Fernald, Wiegand & Darlington,* no. 6069; bare spots, French (or Tweed) Island, *Fernald, Long & Fogg,* no. 375; cliffs near Frenchman's Cove, Bay of Islands, *Mackenzie & Griscom,* no. 10,402; calcareous gravelly bank, Port au Port, *Fernald & Wiegand,* no. 3886. Quebec: limestone and calcareous sandstone terraces, Blanc Sablon,[1] *Fernald & Wiegand,* nos. 3888, 3890, *Fernald, Wiegand & Long,* no. 28,914; grassy shore, Wapitagun, July 14, 1927, *H. F. Lewis* (Can.); rocky shore, Goynish, *St. John,* no. 90,675; limestone headland,

[1] The original labels read "Labrador," but by recent decision of the Privy Council Blanc Sablon is transferred to Quebec.

Pointe-aux-Esquimaux, Mingan, *St. John*, no. 90,674; plages calcaires de la petite rivière, Pointe-aux-Esquimaux, *Victorin & Rolland*, no. 18,485; sur les calcaires du rivage, Ile à Marteau, Mingan, *Victorin & Rolland*, no. 18,565; sur les rivages calcaires, Grande Ile, Mingan, *Victorin & Rolland*, no. 21,832; Baie Ellis, Anticosti, *Victorin*, no. 4188; alluvion argilo-calcaire, Rivière Jupiter, Anticosti, *Victorin & Rolland*, no. 25,139; Salt Lake, Anticosti, *J. Macoun*, no. 15,833 (Can.); Bonaventure conglomerate (calcareous) sea-cliffs, Bonaventure Island, *Fernald & Collins*, no. 1148, *Victorin et al*, nos. 17,642, 17,644; cliffs and ledges, Percé, *J. M. Macoun*, no. 68,949 (Can.), *Collins, Fernald & Pease*, nos. 5319, 5320, 5434, 5435, 5554, *Fernald & Collins*, nos. 1147, 1149; sur les calcaires, Anse à l'Indien, *Victorin, Rolland, Brunel & Rousseau*, no. 17,643; limestone cliffs, Cape Rosier, *Frits Johansen*, no. 103,287 (Can.); calcareous sea-cliffs, Christie, *Fernald & Pease*, no. 25,233; sea-cliffs, Tourelle, *Griscom, Mackenzie & Smith*, no. 25,981; calcareous sea-cliffs, Jaco Hughes, *Fernald & Pease*, no. 25,232; wooded banks of the St. Lawrence, Matane, August 7, 1904, *F. F. Forbes;* shaded calcareous cliffs, Bic, *Fernald & Collins*, nos. 243 (TYPE in Gray Herb.), 1146; wet shore of the St. Lawrence, Temiscouata, August 7, 1879, *Pringle;* Pointe à Persil, Rivière du Loup, *Victorin*, no. 131. MAGDALEN ISLANDS: Entry Island, June 23, 1861, *Hyatt, Verrill & Shaler.* NOVA SCOTIA: dripping cliffs, Baxter's Harbour, July 10, 1900, *F. G. Floyd;* cliffs and ledges, Morden, *W. H. Harrington*, no. 644 (Can.); crests of basalt cliffs by Bay of Fundy, near Margaretville, *Bissell, Bean, White & Linder*, no. 22,234; turfy crests and slopes of exposed headlands, Markland (Cape Forchu), *Fernald, Bartram, Long & Fassett*, no. 24,327; Chebogue Point, *John Macoun*, no. 81,152. MAINE: Houlton, 1880, 1881, *Kate Furbish;* foot of Mt. Kineo, Moosehead Lake, August, 1866, *A. H. & C. E. Smith;* north side of Mt. Kineo, September 21, 1887, *G. G. Kennedy;* gravel, Libby Islands, Machiasport, *Cushman & Sanford*, no. 1515.

P. laurentiana is the plant published originally as *P. farinosa*, var. *macropoda*. On account of *P. macropoda* Craib it is necessary to assign a new name. It is a coarser plant than the European *P. farinosa* to which it has always been referred, either as identical or as a geographic variety. The dwarf northern extremes (from southern Labrador and northern Newfoundland) simulate *P. farinosa* and have often been mistaken for it, but in its typical development, *P. laurentiana* is taller and stouter; the bracts of the involucre longer, 0.5–1.4 cm. long (in European *P. farinosa* 4–7 mm. long); the pedicels stouter; the calyx commonly much more farinose, urceolate-campanulate, in fruit 5.5–11 mm. long and 3–6 mm. in diameter (the efarinose to but slightly farinose calyx of *P. farinosa* more turbinate,

in fruit only 4–6 mm. long and 2.5–4 mm. in diameter); the capsules larger and the seeds with more conspicuous reticulation. Plate 169 is from a photograph taken at the type-station by Professor J. F. Collins.

In view of the pronounced selection of calcareous habitats by *P. laurentiana* it is worth noting that Contejean classified the European *P. farinosa* as one of the "*Calcifuges presque indifférentes, cependant plus nombreuses sur les sols privés de calcaire;*"[1] and that Warming indicates[2] *P. farinosa* as a typical oxylophyte, listing it along with *Vaccinium uliginosum* and *V. Oxycoccus.* On the other hand, Tansley makes *Primula farinosa* in Great Britain distinctly calcicolous, saying, "*Actaea spicata* and *Primula farinosa* also seem to have found the siliceous soils of the Leeds and Halifax district an effectual barrier against a southern extension of their range";[3] and he definitely lists it as one of the characteristic plants which "On the Pennines, for example, . . . occur on the swamps of the limestone hills."

In *P. laurentiana* the pedicels are commonly elongate, but at the northern part of its range they may be very short or almost wanting. These specimens with abbreviated pedicels have been confused with the Great Plain and Rocky Mountain *P. incana,* but they differ from that species in their involucral bracts, broad corolla-lobes, and other characters which show them to be merely dwarfed states of *P. laurentiana.* Other plants of *P. laurentiana* with unusually small calyces and capsules have sometimes been identified with the plant of the Great Lakes which Torrey described as *P. farinosa,* var. *americana;* but the Great Lake material, though often quite farinose (and thus strongly simulating *P. farinosa* and *P. laurentiana*) has a technical character which allies it as much to *P. mistassinica:* the capitate stigma or the tops of the anthers protruding from the throat of the shrivelling corolla. The plants of Newfoundland and Quebec which have been misidentified with *P. farinosa,* var. *americana* are clearly only attenuate forms of *P. laurentiana.* The plants of Mt. Kineo, Maine are extreme cases of this attenuation; the leaves being remarkably thin and delicate, the scapes unusually slender, and the small calyces with unusually thin and sharp lobes; but these seem to be only slight ecological modifications, presumably due to the habitat,

[1] Contejean, *Influence du Terrain sur la Végétation,* Ann. Sci. Nat. sér. 6. ii. 300 (1875).

[2] Warming, Oecology of Pl. ed. Groom & Balfour, 193 (1909).

[3] Tansley, Types of British Vegetation, 157 (1911).

at the foot of a north-facing precipice rather than in more exposed and better illuminated spots, such as the plant usually selects.

Ordinarily *P. laurentiana*, like *P. farinosa* and *P. incana*, has the lower surface of the leaf strongly farinose or whitened with waxy particles. When the specimens have been dried over extreme heat or when immersed in alcoholic solutions in poisoning, the wax is often removed and the leaves have a deceptive post-mortem greenness. Occasionally, however, considerable colonies of *P. laurentiana* are found with absolutely green and efarinose foliage; and, unless their characters of calyx, corolla, capsule and seeds are carefully examined, they are likely to be misidentified either as *P. stricta*, which is high-northern, or with *P. mistassinica*, which abounds through much of the range of *P. laurentiana* but which has more slender scapes and pedicels, calyx and capsules, shorter bracts and smaller and only obscurely pebbled seeds. The green form of *P. laurentiana* is apparently parallel with *P. farinosa*, var. *denudata* Koch of Europe. It is merely a minor form, but as a striking variation, may appropriately be designated

P. LAURENTIANA, forma **chlorophylla**, n. f., foliis subtus efarinosis.—NEWFOUNDLAND: Cape Norman, *Wiegand & Long*, no. 28,909; Sacred Island, *Wiegand, Gilbert & Hotchkiss*, no. 28,908; Sandy (or Poverty) Cove, *Fernald, Long & Dunbar*, no. 26,955; Capstan Point, Flower Cove, *Fernald, Long & Dunbar*, no. 26,957; Yankee Point, *Wiegand & Hotchkiss*, no. 28,904; turfy limestone barrens, Dog Peninsula, August 27, 1925, *Fernald, Wiegand, Long, Gilbert & Hotchkiss*, no. 28,913 (TYPE in Gray Herb.); Bard Harbor, *Fernald & Long*, no. 28,911. QUEBEC: Anticosti Island, *Pursh;* Ilets Perroquets, Mingan, *Victorin & Rolland*, no. 18,421; wet mossy swale, Puffin Island, St. Mary Islands, July 27, 1927, *H. F. Lewis* (Can.). MAINE: base of Kineo Cliff, Moosehead Lake, July 24, 1866, August, 1867, *A. H. & C. E. Smith* (Penn.), June 8, 1878, *F. S. Bunker*.

3. P. INCANA Jones. *Leaves* strongly (rarely only slightly) *farinose beneath*, elliptic, oblong-obovate or spatulate, without petioles or in attenuated plants with winged petioles, obtuse, *shallowly denticulate*, 1.5–8 cm. long, 0.5–2 cm. broad: *scape* 0.5–4.5 dm. high, strict and stout, *1–2 mm. in diameter* below the inflorescence, *farinose at summit: involucral bracts lanceolate to linear-oblong, flat* (slightly involute only on drying), broadly gibbous at base, 0.5–1 cm. long, *mostly equaling or exceeding the short* and stout *flowering pedicels: umbel* 2–14-flowered, *subcapitate*, but with some fruiting pedicels elongating to 1–2.5 cm. long: *calyx* urceolate-campanulate, usually *strongly farinose*, in maturity 8–10 mm. long and 4–5 mm. in diameter; the *oblong* obtuse or rarely acutish *lobes shorter than the tube: corolla* lilac; the *tube*

slightly exceeding the calyx; the limb 6-10 mm. broad, with oblong to cuneate-obovate lobes 2–3 mm. broad; stigma and anthers not exserted from the yellow throat: *capsule* ellipsoid, *only slightly exceeding the calyx: seeds strongly angled, 0.5–0.7 mm. long, conspicuously reticulated.* —Proc. Cal. Acad. ser. 2, v. 706 (1895). *P. farinosa,* var. Gray, Proc. Acad. Nat. Sci. Phila., 1863: 70 (1863). *P. dealbata* Engelm. in Gray, l. c. (1863) as synonym. *P. americana* Rydb. Bull. Torr. Bot. Cl. xxviii. 500 (1901). *P. farinosa,* var. *genuina* Pax, in Engler's Bot. Jahrb. x. 199 (1889) in part, as to Rocky Mt. material. *P. farinosa,* subsp. *eufarinosa,* var. *genuina* Pax & Knuth in Engler, Pflanzenr. iv[237]. 83 (1905), as to synonymy in part and citation of Colorado material. *P. farinosa,* var. *incana* (Jones) Fernald, RHODORA, ix. 16 (1907). *P. farinosa,* var. *macropoda* Fernald, RHODORA, ix. 16 (1907) in small part (as to plants of Saskatchewan, Athabasca and Mackenzie). Illustrated as *P. farinosa* in Clements & Clements, Rocky Mt. Flowers, t. 16, fig. 1 (1914) and by McCalla, Wild Fl. W. Can. 37 (1920).—Meadows, bogs and damp places, Mackenzie to Colorado and Utah. MACKENZIE: Great Slave Lake, *Richardson.* SASKATCHEWAN: without locality, 1858, *Bourgeau;* Carlton House, *Richardson;* bank of Saskatchewan R., Prince Albert, *J. Macoun,* no. 12,211 (Can.); borders of marshes, Pleasant Plain, *J. Macoun,* no. 15,837 (Can.); borders of marshes near the South Saskatchewan, *J. Macoun,* no. 15,838 (Can.); Souris Plain, *J. Macoun,* no. 15,830 (Can.); damp thickets along Humber Creek, Moose Jaw, *J. Macoun,* no. 12,742 (Can.); Cypress Hills, *J. Macoun,* no. 5313; Farewell Creek, Cypress Hills, *J. Macoun,* no. 11,776 (Can.). ALBERTA: The Cascade, Athabasca River, *Elizabeth Taylor,* nos. 38, 110; White Mud River, *Spreadborough,* no. 19,852 (Can.); wet spots, Edmonton, *McCalla,* no. 2590 (Can.); grassy banks, Red Deer, *H. H. Gaetz,* no. 7476 (Can.); boggy ground, West Fork, Water Coulée, near Rosedale, *Moodie,* no. 942; bank of Bow River, Calgary, *Malte & Watson,* no. 118,331 (Can.); Elbow River, *J. Macoun,* no. 24,528 (Can.); Rocky Mountains, *Burke;* foot of Devil's Lake, *J. Macoun,* no. 101,401 (Can.). MONTANA: Willow Creek, *Scribner,* no. 143; moist meadow, Armstead, Beaverhead Co., *Payson & Payson,* no. 1735; mountain canyons, Anaconda, *Blankinship,* no. 727 (Can.). WYOMING: Little Laramie River, *Nelson,* nos. 1871, 1961; damp soil, Hot Spring Bar, 20 mi. south of Jackson, *Merrill & Wilcox,* no. 1039; wet soil, Adams Ranch, Jacksons Hole, *Merrill & Wilcox,* no. 990; low meadow near North Pilot Butte, *Merrill & Wilcox,* no. 749; meadow 20 mi. west of Big Piney, Sublette Co., *Payson & Payson,* no. 2648. COLORADO: Rocky Mts., lat. 39° 41′, 1862, *Hall & Harbour,* no. 378; South Park, *E. L. Hughes,* no. 45; Grape Creek, Custer Co., July 2, 1888, *Demetrio;* Gunnison, *Baker,* no. 361.

Jones's original material was from cold bogs at the head of Sevier River, Utah, I have not seen the type but the description clearly

belongs to the characteristic plant of the Rocky Mountain and Great Plain area. The name *P. dealbata* Engelm. (1863), having been published merely as a synonym, cannot displace the validly published, but later *P. incana* Jones (1895). In its smaller extremes *P. incana* closely simulates *P. stricta*, but when well-developed it is quite distinct in its large and copiously farinose leaves, flat and rather broad bracts, and longer and broader strongly farinose calyx.

In its subcapitate inflorescence and plane bracts *P. incana* is nearer related to *P. decipiens* of southern South America (*P. magellanica* of authors) than to other members of the *Farinosae*. This relationship of the Magellanic and Rocky Mountain plants, long familiar in other groups, was clearly recognized by Asa Gray, who, however, failed to detect the characters which separate the two. In enumerating the Rocky Mountain plants of Hall & Harbour, Gray said:

"378. Primula farinosa L., var. foliis sessilibus; umbella capitata; calyce cylindraceo tubum corollae subaequante. *P. dealbata*, Engelm. in litt. But it exactly accords with the left-hand figure of *P. farinosa*, var. *Magellanica* of Hooker's Flora Antarctica (*P. decipiens*, Duby), and with my Antarctic specimens, except that the calyx is perhaps a little longer, and the corolla bluish-purple. . . . It is interesting thus to connect the Antarctic with the northern forms, by specimens from the Rocky Mountains in about lat. 40°."[1]

As stated, Gray overlooked some very real characters: *P. decipiens* (*P. farinosa*, var. *magellanica*) with longer calyx-lobes, the corolla with shorter tube and with much larger white (rarely lilac-tinged) limb (1.2–2 cm. broad) with lobes twice as broad, capsule much longer, and seeds the largest in the section (1 mm. long), rounded-obovoid and conspicuously muricate; but the affinity of *P. incana* is, nevertheless, with *P. decipiens* rather than with *P. farinosa*.

4. P. decipiens Duby. *Leaves* spatulate to narrowly ovate, obovate or rhombic, tapering to a sessile base or broad petiole, *serrulate-dentate*, 1–9 cm. long, 0.7–2 cm. broad, efarinose or farinose beneath: *scape* 0.3–5 dm. high, *stout*, up to 4 mm. in diameter below the umbel, farinose at summit: *involucral bracts flat, lanceolate*, 6–10 mm. long, broadly gibbous at base: *umbel subcapitate*, few- to many-flowered: pedicels stout, pulverulent, lengthening in fruit to 2–10 mm.: *calyx* urceolate-campanulate, *efarinose* or sparingly farinose, in maturity about 1 cm. long and 5 mm. in diameter; the oblong-lanceolate obtuse to acutish *lobes equaling the tube: corolla white* or sometimes tinged with lilac; the greenish *tube shorter than to barely equaling the calyx:*

[1] Gray, Proc. Acad. Nat. Sci. Phila. (1863) 70.

the limb 1.2–2 cm. broad, with obcordate and cuneate-obovate *lobes 3.5–6 mm. broad:* anthers and stigma not exserted from the yellow throat: *capsule* ellipsoid or slenderly ovoid, *distinctly exceeding the calyx: seeds* dark-brown, *1 mm. long, rounded-obovoid, conspicuously muricate.*—Mém. Fam. Prim.—Mém. Soc. Phys. d'Hist. Nat. Genève, x. 46, t. ii. fig. 1 (1844); Duby in DC. Prodr. viii. 44 (1844). *P. magellanica* Hook. Fl. Ant. ii. t. cxx. (1847); Skottsberg, Bot. Surv. Falk. Isl.—Kungl. Sv. Vet. Akad. Handl. l. no. 3: 46 (1913); Skottsb. Vegetationsverhältnisse längs der Cordillera de los Andes. —Bot. Ergebn. Schwed. Exped. Patag. Feuerl. 1907–1909, v. 285 (1916); not Lehm. Mon. Prim. 62, t. vi (1817). *P. farinosa,* var. *magellanica* Hook. Fl. Ant. ii. 337, t. cxx (1847)[1]; Decaisne in Dumont-D'Urville, Voy. au Pole Sud, Bot. ii. 24, t. 31, fig. 5 (1848–53); Franchet, Miss. Scientif. Cap Horn, 1882–1883, v. 354 (1889); Dusén, Svenska Exped. Magellansl. iii. no. 5: 139 (1900); Macloskie, Rep. Princeton Univ. Exped. Patag. 1896–1899, viii[2]. 650 (1905); Pax & Knuth in Engler, Pflanzenr. iv[237]. 85 (1905); De Wildem. Phan. des Terres Magel. 138 (1905); Reiche, Fl. Chil. v. 93 (1910); Vallentin & Cotton, Ill. Fl. Pl. and Ferns Falk. Isl. t. 41 (1921); not *P. magellanica* Lehm. (1817). *P. farinosa* Gay, Fl. Chil. iv. 367 (1849), not L.—Falkland Islands and from Fuegia northward along the Andes of Chili and Argentina to lat. 38° (acc. to Skottsberg).

There is no doubt as to the application of the name *Primula decipiens.* Duby clearly illustrated the plant and his description explicitly gives the diagnostic characters: "foliis . . . serrulatis . . . . , ... invol. . . . . calyces subaequantis foliolis elongato-lanceolato-linearibus . . ., calycis . . . . laciniis . . . obtusis, cor. . . . . lobis late obcordatis . . . Flores subsessiles etiam in planta fructifera; corollae majores quam in P. farinosa."

Lehmann's *P. magellanica,* to which all subsequent authors except Duby have referred the Falkland and Patagonian plant, differed in many striking characters from the plant with subcapitate white flowers which Duby correctly set off as *P. decipiens.* Lehmann's description called for "Folia . . . dentato-crenata" and his figure of a large plant shows teeth less salient than in large plants of *P. decipiens. P. magellanica* had "Involucri foliola . . . unguicularia," but the bracts of *P. decipiens* are flat and hardly unguiculate. The umbel of *P. magellanica* was described: "Pedicelli . . . unciales . . . Calyx . . . laciniis ovatis, acutis, . . . Corolla . . . carnea: . . . laciniis cuneiformi-

[1] In the text Hooker treats the plant as a variety, but the caption of the plate reads *Primula Magellanica.*

bus"; and the plate accurately coincides with the description, showing flowering pedicels twice as long as the involucre, ovate acute calyx-teeth only half as long as the tube, and narrowly cuneate corolla-lobes only 3–3.5 mm. wide. *P. decipiens*, however, has pedicels nearly obsolete or in fruit only a few millimeters long, the calyx-lobes oblong and obtuse to only subacute and equaling the tube; the white (rarely lilac-tinged) corolla with cuneate-obovate lobes much broader (3.5–6 mm. broad). All authors except Duby have, as said, consistently treated the plant of subantarctic South America as *P. magellanica* or as *P. farinosa*, var. *magellanica* (or sometimes as *P. farinosa*), but either Lehmann's plant did not come from the Straits of Magellan, as he supposed, or else he had a very rare species which has escaped subsequent collectors. It is to be noted that he received the plant indirectly and it is probable that there was some error as to its geographic origin: "Pulchra haecce et nova species Parisiis a Dom. de JUSSIEU absque nomine, sed cum nota: hab. ad fretum Magellanicum, communicata mecum est. In nullo alio herbario eam vidi; neque minus, qui plantam detexerit, cognitum habeo." At any rate, unless *P. decipiens* is far more variable than the six collections before me and the descriptions or plates of such authors as Duby, Hooker, Decaisne, Skottsberg and Vallentin & Cotton indicate, it is wiser not to take up for it the name *P. magellanica* Lehm.

The occurrence of *P. decipiens* in southern South America, separated by about 78 degrees of latitude from its nearest ally in Colorado and Utah, has naturally attracted comment. Thus Hooker, failing to note the characters of the involucre and the very distinct seeds and consequently reducing the plant to varietal rank under *P. farinosa*, said: "One argument which militates against the common origin of the individuals from the opposite hemispheres, must not be overlooked; it is the absence of the plant, and, indeed, of the whole genus, in any part of the Andes [i. e. the Cordillera] south of 39° north lat.; a circumstance which makes it very difficult to account for its appearance in the two opposite temperate zones, if all the individuals of both hemispheres are supposed to have sprung from one parent."[1] Gray's comment in 1863, when he identified the Great Plain and Rocky Mountain plant with the Magellanic, has been quoted in the discussion of *P. incana*. Franchet (1889) and Macloskie (1905)

[1] Hook. Fl. Ant. ii. 337 (1847).

have reiterated the fact, but have added nothing to its interpretation. It is at least noteworthy that the Magellanic plant is closest related apparently, to *P. incana* of the northern Cordillera and Great Plains (Utah and Colorado north to Mackenzie) and that the smallest extremes of the latter are separated only with difficulty from the circumpolar arctic and subarctic *P. stricta*. In eastern North America, centering on the unglaciated areas about the Gulf of St. Lawrence, dwarf extremes of *P. laurentiana*, superficially so strongly resemble *P. incana* that they have been mistaken for it, and in its efarinose form *P. laurentiana* is separated from the arctic *P. stricta* only with difficulty. Similarly, *P. farinosa* of temperate Eurasia is often difficult to distinguish from *P. stricta* and under their treatment of the latter species Pax & Knuth specially say: "Species haec valde affinis *Pr. farinosae* et forsan melius pro ejus varietate habenda." From this line of evidence it may well be that the arctic *P. stricta* is the progenitor from which have been derived *P. farinosa* and other species of Eurasia, *P. laurentiana* of the Gulf of St. Lawrence region, *P. intercedens* of the upper Great Lakes, *P. incana* of the North American cordillera and still farther isolated, *P. decipiens* of the southern American cordillera.[1]

(To be continued.)

SOME ILLINOIS ASTERS AND A NEW VARIETY OF A. MULTIFLORUS.

H. C. Benke.

In September and October of 1927 the writer made a trip from Chicago to southern Illinois and adjacent Missouri, making numerous stops for collecting, with the genus *Aster* under particular observation. Among many specimens obtained the following seem worth recording.

Specimens of *Aster furcatus* Burgess, secured at Crystal Lake, McHenry County, on Sept. 15th (*Benke 4366*) were found to be with-

[1] Similar lines of descent from living arctic species have been suggested in Fernald, *Persistence of Plants in Unglaciated Areas of Boreal America*, Mem. Am. Acad. xv. 334 (1925); and numerous arctic species besides *Primula stricta*, with endemic representatives along the North American cordillera or about the Gulf of St. Lawrence, have their isolated Magellanic or Falkland ally or allies; in such genera as *Puccinellia*, *Draba*, *Saxifraga*, *Empetrum*, *Euphrasia*, *Antennaria*, *Agoseris*, *Taraxacum*, etc.; while others, like *Carex incurva*, *C. Macloviana*, *Plantago juncoides*, etc., show little, if any, differentiation.